

Climatological and Cultural Influences on Annual Groundwater Decline in the Mississippi Delta Shallow Alluvial Aquifer: Identifying the Causes and Solutions

Basic Information

Title:	Climatological and Cultural Influences on Annual Groundwater Decline in the Mississippi Delta Shallow Alluvial Aquifer: Identifying the Causes and Solutions
Project Number:	2007MS63B
Start Date:	3/1/2007
End Date:	8/31/2008
Funding Source:	104B
Congressional District:	3rd
Research Category:	Climate and Hydrologic Processes
Focus Category:	Climatological Processes, Groundwater, Water Use
Descriptors:	
Principal Investigators:	Charles Wax, Jonathan Woodrome Pote

Publication

1. Wax, C.L., J.W. Pote, and T.L. Merrell (2008). Climatological and cultural influences on annual groundwater decline in the Mississippi Delta shallow alluvial aquifer. 38th Annual Mississippi Water Resources Conference, April 15–16, 2008, Jackson, MS, Book of Abstracts, p. 24.

Mississippi Water Resources Research Institute (MWRRI)

Quarterly Report – (From) 7/1/07 – (To) 03/31/08

Reports due: 1st (March 31); 2nd (June 30); 3rd (Sept. 30); 4th (Dec. 31)

Note: Please complete form in 11 point font and do not exceed two pages. You may reference and append additional material to the report.

SECTION I: Contact Information

Project Title: Climatological and cultural influences on annual groundwater decline in the Mississippi Delta shallow alluvial aquifer: identifying the causes and solutions

Principal Investigator: Charles L. Wax, PI (co-PI Jonathan Pote, Joe Massey)

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SECTION II: Programmatic Information

Approximate expenditures during reporting period:

Federal: _\$13,940, Non-Federal: _\$8,000____, Cost Share: ____0____

Equipment (and cost) purchased during reporting period: none

Progress Report (Where are you at in your work plan):

Water use from the delta aquifer has been quantified by crop, acreage, and irrigation method. A relationship between growing season rainfall and irrigation water use has been developed to link interannual variations in water use to variations in climate (rainfall). A complete prototype water use model has been completed using acreages, irrigation methods, and management strategies in place during 2006 in Sunflower County to predict annual water demand for cotton, rice, soybeans, corn, and catfish.

The growing season climate data for the last 45-years were used to run the water demand model for a 45-year (2008-2053) period into the future to assess aquifer drawdown and recharge characteristics annually and cumulatively over the long-term period. Changes in acreages of the major crops, specific irrigation methods, and water management strategies were used to create various scenarios, then conduct multiple model runs to assess the effects of the instituted changes on aquifer drawdown and recharge characteristics over the long-term period.

Problems Encountered:

Identifying controls of aquifer recharge rates has not been successful. Attempts to relate recharge to Mississippi River stage on the west, to Grenada Lake stage on the east, and to non-growing season precipitation totals on both east and west sides of the delta have not been successful. Changes in cultural practices adopted for the various model run scenarios are not known to be practical or economically feasible—these need to be confirmed as valid possibilities before rigid recommendations are developed.

Publications/Presentations (Please provide a citation and if possible a .PDF of the publication or PowerPoint):

1. Presentation of preliminary results to Mississippi Department of Environmental Quality, October 15, 2007.
2. Presentation of preliminary results to Yazoo-Mississippi Delta Joint Water Management

District Board of Directors, October 17, 2007.

3. Presentation of nearly-complete results to Groundwater Management Districts Association conference, Tallahassee, FL, January 7, 2008.

4. Presentation of nearly-complete results to Office of Land and Water, Mississippi Department of Environmental Quality, Jackson, MS, February 12, 2008.

[The PowerPoint slides used in these presentations are sent as a separate file along with this report.]

5. Submitted abstract, "Climatological and cultural influences on annual groundwater decline in the Mississippi Delta shallow alluvial aquifer," for 38th Annual Mississippi Water Resources Conference to be held April 15-16, 2008 in Jackson, MS.

Student Training (list all students working on or funded by this project)

Name	Level	Major
Tia L. Merrell	M.S.	Geosciences

Next Quarter Plans:

Complete final computer simulations for year 1 and begin gather data to refine the model and conservation recommends for year 2.

Write a paper for presentation at and publication in the Proceedings, Mississippi Water Resources Conference.

Begin writing an article for publication in the Transactions of the American Society of Agricultural and Biological Engineers or a similar journal.

Section III. Signatures

Project Manager

Date

Charles L. Wax

March 28, 2008